

REMARKS

Claims 1-4 and 6 are pending. Claims 1 and 6 have been amended. Claim 1 has been amended to clarify that the present invention results in cellulose derivatives that have improved filterability and a reduction in the formation of microgel. Support for this amendment is found in the specification and claims as originally filed, including at page 10, lines 1-13. Claim 6 has been amended to provide proper antecedent basis.

It is respectfully submitted that the present amendment presents no new issues or new matter and places this case in condition for allowance. Reconsideration of the application in view of the above amendments and the following remarks is requested.

I. The Rejection of Claims 1-6 under 35 U.S.C. 103(a)

Claims 1-6 are rejected under 35 U.S.C. 103(a), as allegedly unpatentable over ADMITTED PRIOR ART (DE 44 40 245) in view of WO 96/02632. The Examiner contends that DE 44 40 245 teaches pre-treating cellulose with a cellulase enzyme followed by modifying the treated cellulose with a quarternary ammonium base to reduce the degree of depolymerization and to produce a hydroxylalkyl-cellulose ether. The Examiner states that it would have been obvious to substitute the cellulase enzyme of WO 96/02632 with the hemicellulase of WO 96/02632. This rejection is respectfully traversed.

There is no teaching or suggestion in either of the references to substitute the cellulase employed in the process of DE 44 40 245 with the hemicellulase disclosed in WO 96/02632. Cellulase and hemicellulase are different enzymes having different activities. Cellulases cleave cellulose. Hemicellulases cleave hemicellulose. One skilled in the art cannot expect that the results with a cellulase are suggestive of the results with a hemicellulase in the claimed process. Indeed, an example of the differences is the significant difference seen in the degree of substitution resulting from the use of a hemicellulase as compared to a cellulase. As disclosed in the DE 44 40 245, the use of cellulases results in a very low degree of substitution ($DS < 2$). See DE 44 40 245 at page 1 of the English translation provided. However, as disclosed in the specification (e.g., at page 2, line 1 to 7), cellulose ethers having a low degree of substitution are not desired due to poor solubility and uneven etherification, and these problems are avoided by the use of a hemicellulase in accordance with the present invention.

Accordingly, DE 44 40 245 in combination with WO 96/02632 clearly does not suggest the present invention. For the foregoing reasons, Applicants submit that the claims overcome this

rejection under 35 U.S.C. 103(a). Applicants respectfully request reconsideration and withdrawal of the rejection.

II. The Rejection of Claims 1, 3, 5 and 6 under 35 U.S.C. 103(a)

Claims 1, 3, 5 and 6 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Hyatt et al. (U.S. Pat. No. 6,057,438) in view of Hideaki Saito et al. (U.S. Pat. No. 4,250,305).

Hyatt et al. discloses the use of an xylanase to treat paper grade wood pulp for the manufacture of rayon, cellulose ethers and cellulose esters. Hyatt et al. does not disclose the step of further modifying the enzymatically treated pulp by chemical etherification. The Examiner alleges, however, that the motivation to chemically modify the treated pulp of Hyatt et al. by etherification is found in Saito et al., which the Examiner states teaches a process for preparing cellulose ether by treating cellulose with an etherifying agent. This rejection is respectfully traversed.

The present inventors have surprisingly discovered that cellulose derivatives resulting from the combination of hemicellulase treatment followed by chemical etherification treatment result in a product having improved filterability and reduced tendency to form a microgel. The present invention is therefore particularly beneficial in preparing cellulose based products such as, wall paper glue. For example, a common problem in wall paper glue is the formation of viscous clots (i.e., fish-eyes), which is an example of a microgel, and which is reduced in accordance with the methods of the present invention.

There is no suggestion in Hyatt et al. that, following a hemicellulase treatment, an artisan should employ a chemical etherification step to provide an improved cellulose derivative. Conversely, there is no motivation in Saito et al. to first employ a hemicellulase step before chemical etherification. Therefore, as there is no suggestion or motivation in either reference to employ a hemicellulase treatment, and then to employ chemical etherification, the combination of references cannot be found to suggest the present invention.

The unexpected nature of the present invention over conventional cellulose derivatives, such as, those produced in Saito et al., is also clearly shown in Examples 1, 2 and 3 of the present application. As shown in these examples, chemically etherified cellulose derivatives (without the pretreatment with a hemicellulase) were compared to cellulose derivatives prepared according to the present invention. As illustrated in the table on page 10, the enzymatically-treated and chemically-etherified cellulose derivatives had unexpected improved

filterability and a reduction in microgel formation as compared to conventional cellulose derivatives.

For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

III. The Rejection of Claims 2 and 4 under 35 U.S.C. 103(a)

Claims 1, 3, 5 and 6 are rejected under 35 U.S.C. 103(a) as allegedly unpatentable over Hyatt et al. (U.S. Pat. No. 6,057,438) in view of Hideaki Saito et al. (U.S. Pat. No. 4,250,305) and further in view of WO 96/02632.

As previously discussed, the combination of Hyatt et al. in view of Hideaki Saito et al. does not suggest the present invention, and therefore, there is no motivation to employ the specific hemicellulase of WO 96/02632 in a process that is not suggested by the prior art.


For the foregoing reasons, Applicants submit that the claims overcome this rejection under 35 U.S.C. 103. Applicants respectfully request reconsideration and withdrawal of the rejection.

IV. Conclusion

In view of the above, it is respectfully submitted that all claims are in condition for allowance. Early action to that end is respectfully requested. The Examiner is hereby invited to contact the undersigned by telephone if there are any questions concerning this amendment or application.

Respectfully submitted,

Date: January 15, 2003



Jason I. Garbell, Reg. No. 44,116
Novozymes North America, Inc.
500 Fifth Avenue, Suite 1600
New York, NY 10110
(212) 840-0097

Attorney Docket No.: 5087.304-US

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Noguchi et al.

Confirmation No: 9126

Serial No.: 09/371,343

Group Art Unit: 1731

Filed: August 10, 1999

Examiner: Alvo, M.

For: Method For Producing Cellulose Derivatives

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Sir:

Below is a marked-up version of the amendments made in the accompanying amendment.

IN THE CLAIMS:

Claims 1 and 6 have been amended as follows:

1. (Amended.) A method for producing a cellulose derivative, said method comprising
 - c) treating a pulp with a hemicellulase under conditions in which the hemicellulase is enzymatically active, and
 - d) etherifying the treated pulp under conditions that result in etherification of cellulose molecules in the pulp, wherein the resulting cellulose derivative has improved filterability and a reduction in the formation of microgel.
2. (Unchanged.) The method of claim 1, wherein the hemicellulase is an enzyme that hydrolyzes E-1,4-glycoside bonds.
3. (Unchanged.) The method of claim 1, wherein the hemicellulase is a xylanase.
4. (Unchanged.) The method of claim 1, wherein the xylanase is obtainable from *Bacillus* sp. SD902.
6. (Amended.) The method of any of claims 1-4, wherein the [chemical modification] etherification of step b) is methyl-etherification, ethyl-etherification, hydroxyethyl-etherification, hydroxypropyl-etherification, or carboxymethyl-etherification.

FAX RECEIVED
JAN 16 2003
GROUP 1700

Jan 15 03 11:40a

Nvozymes North America

(212)840-0221

p.9